BY KEVIN M. SAVETZ

14.4Kbps On Your URL Dial...

Radio On The Internet

As I write this, my computer blares a song by Sunfish, a Canadian band that I've never heard of before. I downloaded the tune from Virtual Radio (*http://www.microserve.net/vradio*), an online warehouse of, well, bands I've never heard of. The song, titled "Difference," is available in its entirety. It's about 2MB and took several minutes to download, but was definitely worth the wait. It's got a beat and you can dance to it.

Yes sir, there's music on the Net. Another Web site offers news and commentary from National Public Radio's *Morning Edition* show. Yet another houses an impressive collection of music from California garage bands. Sure, graphics on the Web are nifty, but as the Internet and multimedia become increasingly intertwined, our other senses yearn for titillation. So, why not audio on the Internet?

Sound on the Internet is in its infancy—standards are still being hashed out, and there are no "killer apps" for audio (yet). But as the Internet takes its slow course towards being the source for five hundred channels of multimedia superhighway mayhem, the ability to transmit sound is becoming essential. Today's experiments with audio on the Net—despite the emerging press releases and corporate propaganda, don't believe that these are anything more than experiments—are a great first step. They provide interesting content, and work on most any computer that can play audio. However, the technology still has hurdles to overcome—most notably, the sound quality of most of these services is low volume, scratchy, and low fidelity.

Still, it's fun to be on the cutting edge, listening to songs from bands I didn't know existed.

Internet Talk Radio

Internet Talk Radio was one of the first well-known experiments in "broadcasting" on the Internet. Actually, ITR doesn't do broadcasting—or even "multicasting" (which is covered below)—they publish audio files that you can download and then listen to on your computer. A typical hour-long radio show consumes a whopping 20MB of disk space. (*http://town.hall.org*)

Some Net users have criticized the concept as a grandiose waste of network bandwidth, given the fact that the same information in text format could fit into only a few kilobytes. "The reason you get audio information from a $3000 (or $30,000) computer," ITR producer Carl Malamud said, "is because ultimately this gives you a very new medium. We're not trying to replace radio, just as the trucks didn't replace the railroads and the telephone didn't replace the telegraph. There are things we can do that you can't do on a radio, like go interactive or add WAIS databases to support a program, or make an audio-on-demand server."

Internet Talk Radio began in 1993, and although it was innovative, production of new shows has slowed as Malamud turns his attention to other projects, such as the upcoming Internet World's Fair.

RealAudio

Fast forward to 1995, when a company called Progressive Networks created a program called the RealAudio Player, software which deals with the biggest shortcoming of Internet Talk Radio: those huge time-sucking, hard-disk-eating audio files. Instead of making you download a complete audio file prior to listening, RealAudio uses audio streaming—it plays the sound as it downloads. Its "audio on demand" technology reduces the wait to hear a program to just a few

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Internet Radio *continued...*

seconds. Because RealAudio uses strong audio compression, you can listen to audio with only a 14.4Kbps modem. (*http://www.realaudio.com*)

The RealAudio Player is free, and works from within your Web browser—click on a RealAudio file, and the Player launches and begins to play. Progressive Networks is lining up traditional broadcasters, including National Public Radio and ABC, to provide material for RealAudio. Net notables including former MTV veejay Adam Curry, Radio Canada, and C-SPAN are publishing information with RealAudio, with certainly more to be announced in coming weeks.

The RealAudio player presents the listener with a set of stop, play, rewind, and fast-forward buttons. Unlike "real" radio, you can stop the music if you need to step away from your desk, and pick up where you left off when you return. Even better, radio shows can be indexed, allowing you to jump straight to the material that interests you. For instance, if you want to hear Radio Canada's news story on why huge chunks of ice are breaking off Antarctica, you can go directly there, skipping over the program's introduction, and never hearing the feature about how sex may control the cockroach population.

RealAudio's sound quality isn't wonderful—it's something akin to AM radio—but speech is certainly understandable. Unfortunately, whether you're connected to the Internet with a 14.4Kbps modem or a T-1 line, RealAudio sounds the same. It's too bad higher bandwidth doesn't bring better quality sound.

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Richard Dean, producer of new media services at National Public Radio, is excited about the benefits of publishing audio on the Internet. He notes that audio-on-demand has its benefits and drawbacks. "As a listener it's a great thing. As a radio programmer maybe it's not such a great thing—it disturbs the continuity of the program," he says. "Instead of pushing info at someone—that's what radio broadcasters do—you allow them to come get it from you.

"The biggest problem with radio is that your work is really ephemeral, it hits the ether and it's gone. No one can hear it again, unless they go buy the tape or the transcript." Because a transcript can't capture the nuances of a news story, and audio tapes take several days or weeks to arrive, the Internet gives NPR listeners the ability to hear—or hear again—a story at any time, when it's convenient. "This is where radio broadcasting—information providing—is going," Dean says.

vat Radio

For some of us, just listening to the radio isn't good enough—we want to be the DJ, spinning discs for all the Internet to hear. In fact, folks are

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Internet Radio *continued...*

already doing this with a resource called Radio Free vat. RFv allows anyone who's connected to the MBONE to check out a chunk of time on a virtual radio station, and play virtual DJ for a couple of hours to an audience of, well, dozens.

There is one catch—in order to participate as a DJ or just listen, you'll need to be connected to the MBONE, the Internet's "Multicast Backbone." Being on the MBONE requires a hefty pipe to the Net—at least 384Kbps, although a T-1 link is preferable—and a powerful workstation. So, the majority of Net users—those of us confined to a home computer and a 14.4Kbps modem—can't participate in RFv, for now.

Dave Hayes, a network and systems administrator for the Network Engineering group of JPL, created Radio Free vat. The idea was born quite by accident. "One day, I cross-connected the CD output [of my workstation] with the vat input and wound up broadcasting a couple minutes of a Chick Corea tune over the MBONE audio channel. I quickly noticed my error, cut off the CD, and made apologies on the audio channel." Someone answered back, "If you play music like that, you can play music anytime you want to."

"Then it hit me," Hayes said. "I used to DJ in college... Why not do this over the Internet? So, I started Radio Free vat. I began to play CDs that I liked. Soon, the idea caught on. I wrote a Perl server which handles session conflicts, and we went from there."

The number of MBONE users is rather small, so RFv doesn't have a huge audience—"The most people I've seen at one time is about 75," Hayes says.

As more users get access to high-bandwidth Internet connections, thanks to affordable services like ISDN, the audience for Radio Free vat will grow. If you thought self-publishing on the Web was popular, wait until everyone with a Net connection and microphone can have their own radio show, without so much as a nod from the FCC.

For More Information

There are plenty of other sources of radio on the Net—from traditional radio stations broadcasting their signals on the Internet, to IUMA, the Internet Underground Music Archive at *http://www.iuma.com*, where you can download tracks from dozens of bands worldwide.

Justin Paulsin maintains a list of radio stations that use the World Wide Web for broadcasting or informational purposes. This document is accessible at *http://american.recordings.com/wwwofmusic/radio.html*.

Yahoo's Index of Radio Stations on the Net is at *http://akebono.stanford.edu/yahoo/Entertainment/Radio/Stations/*.

The MIT List of Radio Stations on the Internet is at *http://web.mit.edu/afs/athena.mit.edu/user/w/m/wmbr/www/otherstations.html*.

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